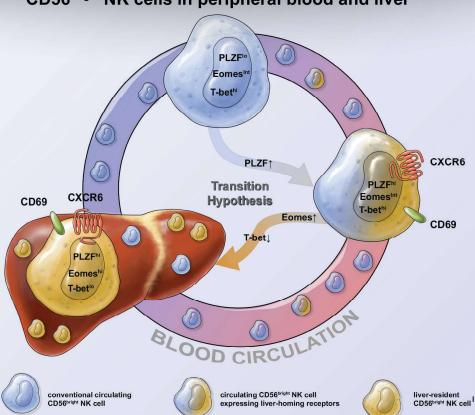


HEPATOLOGY COMMUNICATIONS

Open Access

OFFICIAL JOURNAL OF THE AMERICAN ASSOCIATION FOR THE STUDY OF LIVER DISEASES

CD56^{bright} NK cells in peripheral blood and liver





HEPATOLOGY COMMUNICATIONS

OFFICIAL JOURNAL OF THE AMERICAN ASSOCIATION FOR THE STUDY OF LIVER DISEASES

EDITOR | Gyongyi Szabo, M.D., Ph.D., FAASLD, Boston, Massachusetts

ASSOCIATE EDITORS

Ariel E. Feldstein, M.D., San Diego, CA Kris V. Kowdley, M.D., FAASLD, Seattle, WA

CONSULTING BIOSTATISTICIAN

James Dziura, M.D., Ph.D., New Haven, CT

Pranoti Mandrekar, Ph.D., FAASLD, Worcester, MA Adam Mikolajczyk, M.D., Chicago, IL. Ekihiro Seki, M.D., Ph.D., West Hollywood, CA Norah Terrault, M.D., MPH, FAASLD, Los Angeles, CA Natalie J. Torok, M.D., MSc, FAASLD, Sacramento, CA Kymberly D. Watt, M.D., Rochester, MN

PRODUCTION STAFF

Ann Haran, Managing Editor Jennifer Hutchinson, Medical Journal Editor Candice Dufour, Editorial Assistant Emili Malatesta, Editorial Assistant

EDITORIAL BOARD

Leon Adoms, Perth, Australia
Marco Arrese, Santiago, Chile
Meena Bonsol, New York, NY
John Chiang, Rootstown, OH
Srinivasan Dasarathy, Cleveland, OH
Harshad Devarbhovi, Bangalore, India
Wen-Xing Ding, Kansas City, KS
Ajay Duseja, Chandigarh, India
Akiko Eguchi, San Diego, CA
Jordan Feld, Toronto, Canada
Oren Fix, Seattle, WA
Robert Fontano, Ann Arbor, MI
Guadalupe Garcio-Tsao, New Haven, CT
Jacob George, Westmead, Australia
Marc Ghany, Bethesda, MD
Grace Guo, Piscataway, NJ
George loannou, Seattle, WA

Won-II Jeong, Daejeon, Korea Cynthia Ju. Houston, TX Norifumi Kawada, Osaka, Japan W. Ray Kim, Stanford, CA Paul Kwo, Palo Alto, CA Cynthia Levy, Miami, FL Suthat Liangpunsakul, Indianapolis, IN Keith Lindor, Phoenix, AZ Sophie Lotersztajn, Creteil, France Tom Luedde, Aachen, Germany Harmeet Malhi, Rochester, MN Jessica Mellinger, Ann Arbor, MI Natalia Nieto, Chicago, IL Qin Ning, Wuhan, China John Olynyk, Palmyra, Australia Jan Petrasek, Plano, TX Massimo Pinzani, London, United Kingdom Yury Popov, Boston, MA
Puneet Puri, Richmond, VA
Michoel Schilsky, New Haven, CT
Morino Silveiro, New Haven, CT
Vinoy Sundorom, Arcadia, CA
Fronk Tocke, Aachen, Germany
Tetsuo Tokehoro, Osaka, Japan
Elliot Topper, Ann Arbor, MI
Jonel Trebicko, Bonn, Germany
Luca Valenti, Milano, Italy
Hugo Vargos, Phoenix, AZ
Li Wang, Storrs, CT
Vincent Wong, Hong Kong, China
Alexander Wree, San Diego, CA
Jian Wu, Shanghai, China

AMERICAN ASSOCIATION FOR THE STUDY OF LIVER DISEASES—GOVERNING BOARD 2019

PRESIDENT

Jorge A. Bezerra, Cincinnati, OH PRESIDENT-ELECT Raymond T. Chung, Boston, MA SECRETARY Meena B. Bansal, New York, NY TREASURER Vijay Shah, Rochester, MN PAST PRESIDENT Michael W. Fried, Chapel Hill, NC COUNCILORS Laurie D. DeLeve, Los Angeles, CA Norah Terrault, Los Angeles, CA W. Ray Kim, Stanford, CA COUNCILORS-AT-LARGE
John R. Lake, Minneapolis, MN
David C. Mulligan, New Haven, CT
Mary E. Rinella, Chicago, IL
PUBLICATIONS COMMITTEE CHAIR
Willscott Naugler, Portland, OR

AASLD National Headquarters: 1001 North Fairfax Street, 4th floor, Alexandria, VA 22314. Phone: 703-299-9766; Fax: 703-299-9622; E-mail: AASLD@AASLD.org. Chief Executive Officer, Matthew D'Uva Editorial Office: 1001 North Fairfax Street, Suite 400, Alexandria, VA 22314. Phone: 703-299-9766; Fax: 703-299-9676; E-mail: HEPCOMM@AASLD.ORG

Hepatology Communications, (Online ISSN 2471-254X), is published monthly on behalf of The American Association for the Study of Liver Diseases by Wiley Subscription Services, Inc., a Wiley Company, 111 River St., Hoboken, NJ 07030-5774 USA.

Back Issues: Single issues from current and recent volumes are available at the current single issue price from cs-journals@wiley.com.

Disclaimer: The Publisher, American Association for the Study of Liver Diseases and Editors cannot be held responsible for errors or any consequences arising from the use of information contained in this journal; the views and opinions expressed do not necessarily reflect those of the Publisher, American Association for the Study of Liver Diseases and Editors, neither does the publication of advertisements constitute any endorsement by the Publisher, American Association for the Study of Liver Diseases and Editors of the products advertised.

Journal Customer Services: For ordering information, claims and any enquiry concerning your journal subscription please go to https://hub.wiley.com/community/support/onlinelibrary or contact your nearest office. Americas: Email: cs-journals@wiley.com; Tel: +1 781 388 8598 or +1 800 835 6770 (toll free in the USA & Canada). Europe, Middle East and Africa: Email: cs-journals@wiley.com; Tel: +44 (0) 1865 778315.

Asia Pacific: Email: cs-journals@wiley.com; Tel: +65 6511 8000.

Production Editor: Roy Caratozzolo III (hep4@wiley.com)

Wiley's Corporate Citizenship initiative seeks to address the environmental, social, economic, and ethical challenges faced in our business and which are important to our diverse stakeholder groups. Since launching the initiative, we have focused on sharing our content with those in need, enhancing community philanthropy, reducing our carbon impact, creating global guidelines and best practices for paper use, establishing a vendor code of ethics, and engaging our colleagues and other stakeholders in our efforts. Follow our progress at www.wiley.com/go/citizenship.

View this journal online at wileyonlinelibrary.com/journal/2471254x.

Copyright © 2020 American Association for the Study of Liver Diseases. All rights reserved. No part of this publication may be reproduced, stored or transmitted in any form or by any means without the prior permission in writing from the copyright holder. Authorization to copy items for internal and personal use is granted by the copyright holder for libraries and other users registered with their local Reproduction Rights Organization (RRO), e.g. Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923, USA (www.copyright.com), provided the appropriate fee is paid directly to the RRO. This consent does not extend to other kinds of copying such as copying for general distribution, for advertising or promotional purposes, for republication, for creating new collective works or for resale. Permissions for such reuse can be obtained using the RightsLink "Request Permissions" link on Wiley Online Library. Special requests should be addressed to: permissions@wiley.com

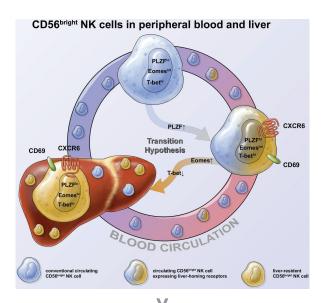
IN THIS ISSUE OF

HEPATOLOGY COMMUNICATIONS

Volume 4 • Number 3 March 2020

Reviews

- 329 Chronic Viral Hepatitis: Current Management and Future Directions Albert Do and Nancy S. Reau
- 342 Hepatocellular Carcinoma—How to Determine Therapeutic Options Neil Mehta



Cover Figure: Model for transition from circulating to liverresident NK cells. CXCR6+CD69+CD56^{bright} NK cells in peripheral blood express high levels of PLZF while largely exhibiting an Eomes^{int}T-bet^{hi} profile. Based on the data of this study and considering evidence for the replenishment of lrNK cells from peripheral blood, we propose a model for human NK cell recruitment into liver tissue by the upregulation of liverhoming markers CXCR6 and CD69 controlled by sequential changes in the transcription factor profile. We suggest that CXCR6+CD69+CD56^{bright} NK cells in peripheral blood represent an intermediate stage that has the potential to be retained in liver tissues when exposed to factors of the intrahepatic microenvironment (e.g., IL-15, TGF-β).

Original Articles

355 Hepatitis C Virus Prevalence in 50 U.S. States and D.C. by Sex, Birth Cohort and Race: 2013-2016

> Heather Bradley, Eric W. Hall, Elizabeth M. Rosenthal, Patrick S. Sullivan, A. Blythe Ryerson, and Eli S. Rosenberg

Woolly Monkey-HBV Infection in Squirrel
Monkeys as a Surrogate Nonhuman
Primate Model of HBV Infection

Christopher Y. Chen, Benjamin Y. Winer,
Deborah Chavez, Bernadette Guerra,
Kathleen M. Brasky, Stacey Eng, Eduardo Salas,
Danny Tam, Joe H. Simmons, Christian R. Abee,
William E. Delaney, Alexander Ploss,
Robert E. Lanford, and Christian Voitenleitner

387 Outcomes of Childhood Cholestasis in Alagille Syndrome: Results of a Multicenter Observational Study

Binita M. Kamath, Wen Ye, Nathan P. Goodrich, Kathleen M. Loomes, Rene Romero, James E. Heubi, Daniel H. Leung, Nancy B. Spinner, David A. Piccoli, Estella M. Alonso, Stephen L. Guthery, Saul J. Karpen, Cara L. Mack, Jean P. Molleston, Karen F. Murray, Philip Rosenthal, James E. Squires, Jeffrey Teckman, Kasper S. Wang, Richard Thompson, John C. Magee, and Ronald J. Sokol, for the Childhood Liver Disease Research Network (ChiLDReN)

399 Primary Sclerosing Cholangitis With Features of Autoimmune Hepatitis: Exploring the Global Variation in Management

> Piotr Milkiewicz, Marcin Krawczyk, Ewa Wunsch, Cyriel Ponsioen, Gideon M. Hirschfield, and Stefan G. Hubscher

409 The Transcription Factor Promyelocytic Leukemia Zinc Finger Protein Is Associated With Expression of Liver-Homing Receptors on Human Blood CD56^{bright} Natural Killer Cells

> Leonard U. Hess, Glòria Martrus, Annerose E. Ziegler, Annika E. Langeneckert, Wilhelm Salzberger, Hanna Goebels, Adrian F. Sagebiel, Sven H. Hagen, Tobias Poch, Gevitha Ravichandran, Martina Koch, Christoph Schramm, Karl J. Oldhafer, Lutz Fischer, Gisa Tiegs, Laura Richert, Madeleine J. Bunders, Sebastian Lunemann, and Marcus Altfeld

- 425 Assessment of Rapid Hepatic Glycogen Synthesis in Humans Using Dynamic ¹³C Magnetic Resonance Spectroscopy Stefan Stender, Vlad G. Zaha, Craig R. Malloy, Jessica Sudderth, Ralph J. DeBerardinis, and Jae Mo Park
- 434 Pirfenidone Is an Agonistic Ligand for PPARα, and Improves NASH by Activation of SIRT1/LKB1/pAMPK

Ana Sandoval-Rodriguez,
Hugo Christian Monroy-Ramirez,
Alejandra Meza-Rios, Jesus Garcia-Bañuelos,
Jose Vera-Cruz, Jorge Gutiérrez-Cuevas,
Jorge Silva-Gomez, Bart Staels,
Jose Dominguez-Rosales, Marina Galicia-Moreno,
Monica Vazquez-Del Mercado, Jose Navarro-Partida,
Arturo Santos-Garcia, and Juan Armendariz-Borunda

- 450 Drug-Induced Liver Injury by Selective Androgenic Receptor Modulators

 Joan Ericka Flores, Shivakumar Chitturi,
 and Sarah Walker
- 453 Thirty-Day Readmission and Cost Analysis in Patients With Cirrhosis: A Nationwide Population-Based Data

Sakkarin Chirapongsathorn, Kittiyod Poovorawan, Ngamphol Soonthornworasiri, Wirichada Pan-ngum, Kamthorn Phaosawasdi, and Sombat Treeprasertsuk

461 Novel Liquid Biopsy Test Based on a Sensitive Methylated *SEPT9* Assay for Diagnosing Hepatocellular Carcinoma

> Yurika Kotoh, Yutaka Suehiro, Issei Saeki, Tomomi Hoshida, Masaki Maeda, Takuya Iwamoto, Toshihiko Matsumoto, Isao Hidaka, Tsuyoshi Ishikawa, Taro Takami, Shingo Higaki, Ikuei Fujii, Chieko Suzuki, Yoshitaro Shindo, Yukio Tokumitsu, Hiroaki Nagano, Isao Sakaida, and Takahiro Yamasaki